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E-learning in mind maps of Czech and Kazakhstan university students

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Abstract

Both the Czech Republic and Kazakhstan, reflecting social changes and latest technical and technological development, have implemented the ICT into education and claimede-learning became standard within higher education. As the systems of education and process of ICT implementation are similar in both countries, we focused on the problem how the term of e-learning is understood by technical university students, monitoring the state and highlighting similarities and differences. The method of mind mapping was applied, being based on the Khan´s concept of eight-dimensional concept of e-learning. The collected data were analyzed under two criteria: number of dimensions accepted from the Khan´s concept and the entire dimensions included/non-included in individual students´ concept. The results were presented in the form of commented diagrams. The results showed the content focus of study programmes strongly corresponded to individual students´ concepts of e-learning and both similar features and differences were detected.

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Keywords: mind maps, higher education, technical, e-learning, Kazakhstan, Czech

1. Introduction

Continuous collecting of realistic and objective feedback and assessment of the process of instruction helps substantially to improving its quality. Approaches to searching for a deeper reflection on how students understand problems and develop concepts provide background for running the learning process efficiently. There exist various

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approaches to collecting the feedback, and the mind mapping (mental mapping, semantic mapping, concept mapping) is one of them.

Mind maps can be used in different phases of the process of instruction, e.g. for learners´ motivation, fixing, practicing, assessing new knowledge etc. The mind maps are diagrams expressing significant relations between terms in the form of statements (Novak, 1998); links between them describe mutual relations. He defines the mind maps can be used as learning and teaching strategies, a means of forming concept and content of single subjects and the instruction as the whole, a means of collecting information about learner´s understanding of the learning content as well as strategies towards mastering new learning content or evaluation learner´s knowledge. This concept was later adapted by Åhlberg (2004). Then, Buzan (2010) defined mind maps as external expressions of knowledge integrated in individual´s mind. He emphasized the mind map was not either ´correct´, or ´incorrect´; it should be always accepted in a certain context, whereas it could be rejected in another one.

If we really aim at making changes and applying new approaches within the educational system, it means that not only objectives, learning content and methods of instruction are to be changed. Strong attention should be also paid to the concept-forming process and the means applied within. Innovations in each subject are always connected to searching for, discovering, introducing, piloting and testing new means of assessment which will enable teachers to discover and understand learner´s understanding of terms and individual structure of knowledge. Currently, the information and communication technologies (ICT) can serve this purpose, e.g. electronic applications for creating and analyzing the mind maps, which are available on web pages of iMind-Map (2011), brainstorm and mind map online (2011), Edraw Mindmap (2011) etc. can be used in this process (Šimonová, 2013).

2. Research design and methodology

The concept of e-learning was researched by the method of mind mapping at the Faculty of Informatics and Management, University of Hradec Kralove, Czech Republic (FIM) and the Karaganda State Technical University, Kazakhstan (KSTU) in 2012. The research objective was to monitor and analyze how students understand the term of e-learning. The method of mind mapping was not used in the traditional form, i.e. respondents did not create the mind map themselves but they were provided the eight-dimensional schema of e-learning designed by Khan (2006, 25), considered it, accepted or rejected the structure and were encouraged to propose changes and/or design their own schema.

The research sample consisted of two groups: (1) the FIM group included 104 respondents, the 1st-year students of the Faculty of Informatics and Management who in summer semester 2011/12 enrolled in the Applied Informatics and Information Management study programmes; (2) the KSTU group embraced 58 students enrolled in the first year of several technical study programmes (excluding Informatics and Management) in winter semester 2012/13.

The Khan´s multi-dimensional schema introduces author´s concept of open, flexible and distributed e-learning. The schema is presented in two versions which are displayed in figure 1.

The versions differ in graphic presentation: in the middle of the left schema the word e-learning is placed whereas the figure of the human being is in the center of the right schema. Khan does not explain how the central symbols should be understood, or whether they express any difference; he understands both versions identical. On the other hand, the versions can be applied as: (1) the learner-oriented process, and/or (2) the highly individualized approach to learning, defined by each learner, reflecting individual learning preferences and other didactic-psychological characteristics (i.e. requirements-oriented learning). The right schema was used in the research.

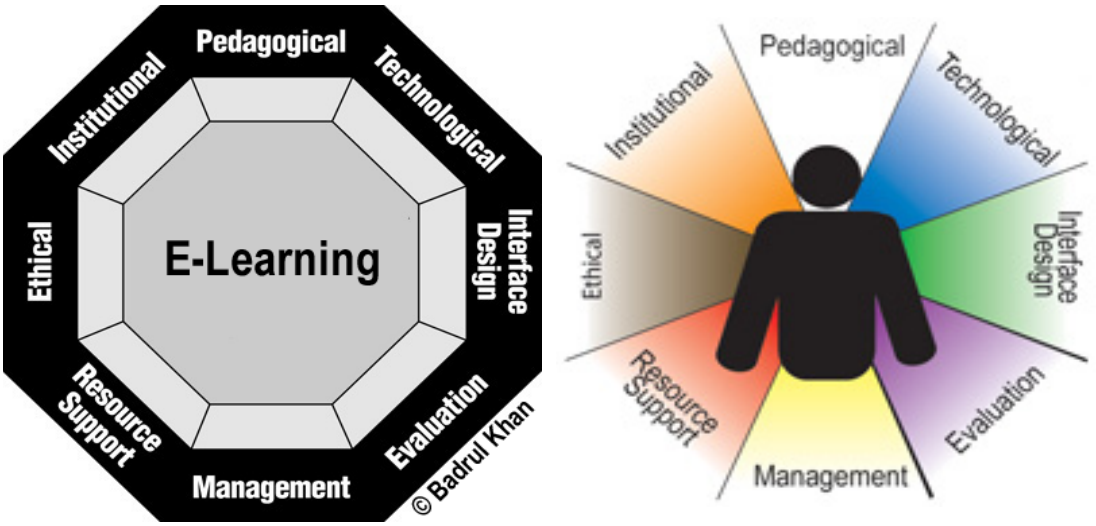

Fig. 1. Two schemas of eight-dimensional approach to e-learning by Khan (2006)

The research procedure followed three phases:

First, students were provided information on how mind maps are created and used.

Second, the Khan´s schema was introduced and explained to students, what the content of single dimensions is. The Khan´s schema of e-learning includes eight dimensions as follows: pedagogical (P); technological (T); interface design (D); evaluation (in this research marked as feedback, F); management (M); resource support (R); ethical (E); institutional (I). Each dimension includes following contents:

- analysis of objects, content and media used, analysis of participants (dimension P);
- organization, methods, strategies used in the environment (T);
- infrastructure design (hardware, software) (D);
- design of e-learning programme (design of pages, content, navigation, tools for testing) (F);
- management (evaluation of learner´s work during the instruction using the assignments, evaluation of the learning environment (M);
- resource support (learning management, ways of providing and spreading information, online support, maintenance (R);
- social influence, cultural and geographical differences, differences in level of entrance knowledge, differences in accessibility to information, ethical and legal rules (E);
- institutional support in the field of e-learning services for students (I).

Third, respondents either modified teh Khan´s schema, or they were encouraged to design their own mind map of e-learning.

3. Results, interpretation, discussion

The collected data were processed by the method of frequency analysis reflecting following criteria:

- how many of Khan´s dimensions were accepted in respondent´s individual concept of e-learning;
- which of Khan´s dimensions were accepted in respondent´s individual concept of e-learning;
- new schemas designed by respondents.

3.1. Amount of Khan´s dimensions accepted in respondent´s individual concept of e-learning

As mentioned above, totally eight dimensions were included in the Khan´s schema of e-learning (see fig. 1).

Figure two (fig. 2) displays the amount of dimensions which were accepted by respondents from both institutions for their individual schemas.

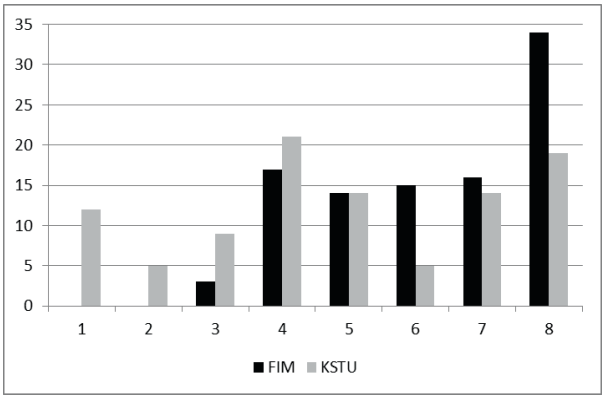

Fig. 2. Amount of dimensions in individual concepts (%)

The results of FIM group show there was no respondent in the research group who did not make any changes in the Khan´s concept. Not a single student worked with one or two dimensions only. Nearly 34 % respondents accepted all eight dimensions whereas 66 % of respondents used from three to seven dimensions: 16.3 % respondents worked with seven dimensions; 15.3 % used six dimensions; 14.4 % of respondents accepted five dimensions and 17.3 % four ones; 3 % of respondents used only three dimensions.

In the STUK group the respondents accepted from one to eight dimensions. Compared to the FIM group, 12 % of them understand e-learning to be a one-dimension phenomenon, two dimensions appeared in 5 % of schemas, whereas most students (21 %) designed a four-dimension model, followed by the eight-dimension schema created by 19 % of respondents.

3.2. Khan´s dimensions accepted in respondent´s individual concept of e-learning

As expected, not all respondents agreed with the complete Khan´s schema and did not include all eight dimensions in their concepts. In figure 3 dimensions which were not accepted by single respondents are displayed.

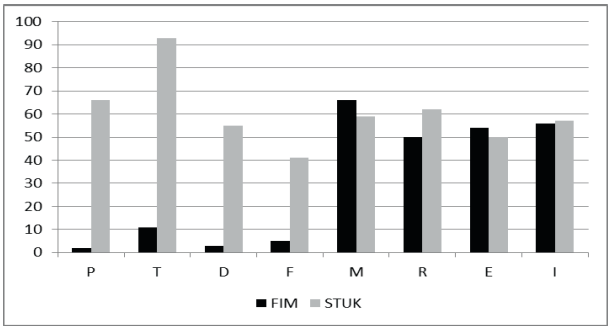

Fig. 3 Dimensions not included in individual concepts (%)

The figure shows rather different understanding of e-learning in the FIM and KSTU groups. The closest approach relates to the institutional dimension which was not accepted by approximately 40 % of respondents of both groups. On the other hand, large differences were detected in the evaluation dimension (F; 43 % in favor of FIM), the Internet design dimension (D; 42 % in favor of FIM), and pedagogical dimension (P; 27 % in favor of FIM), whereas in technological dimension the difference is 12 % in favor of KSTU. As the KSTU group consisted of respondents studying technical study programmes, the latter figure of 12 % verifies their stronger understanding of e-learning concept from the technical/technological point of view. Above all, 9 % of KSTU respondents designed one-dimension concepts of e-learning consisting of the technological dimension only, or the two-dimension schema where only technological and pedagogical dimensions were included (4 %); the pedagogical dimension was completely omitted by 34 % of respondents in the KSTU group. The interface design dimension (D) was not used by 3 % of FIM respondents, which definitely relates to their specialization in Informatics and information technologies – they often understand the interface design dimension crucial in their schemas. The evaluation dimension (F) was not accepted by 59 % of KSTU respondents, which leads us to the idea that electronic tests were not widely used for assessment at KSTU.

3.3. New schemas designed by respondents

Totally 5 % of FIM students and 6 % of KSTU students did not agree with the Khan´s schema and designed their own, completely new ones. Samples of FIM and KSTU mind maps are displayed in figure 4 and figure 5.

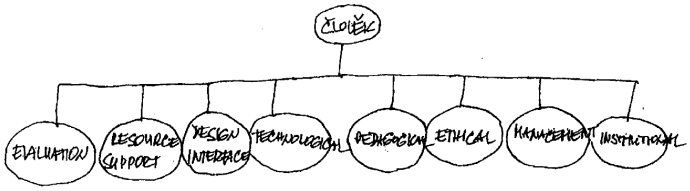

Fig. 4. Example of the FIM mind map

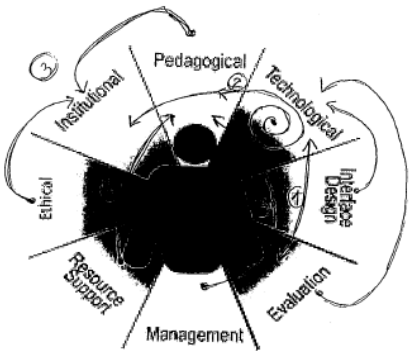

Fig. 5. Example of the KSTU mind map

4. Conclusion

It is hardly possible to sum up all the collected data to a single and homogenous conclusion. FIM students´ approaches reflect agreement on the Khan´s concept of e-learning to the larger extent compared to KSTU students.

The wider acceptation can be appreciated because the Khan´s concept is complex and considers e-learning from the whole width of this phenomenon. On the other side, it should be taken into account that the FIM respondents were students of study programmes focusing on Informatics who relate closer to this field from the point of profession and interest and pay more attention and deeper inside in the field, whereas the KSTU respondents reflected their technical approach and interests in their concepts.

Despite there are not numerous supporters yet, the mind mapping is considered an efficient education tool. It supports the process of learning by helping students collect and structure information, create concepts by making connections between, among, within concepts and identify the missing ones (Åhlberg, 2004). In several countries (France, Finland, UK, Vietnam) the mind maps have been included in educational curricula. This measure has not been applied in the Czech Republic and Kazakhstan yet but supporters of this tool have been using them. This tool having been tested in other researches (e.g. as proposed below) it might widen the application and become a powerful and interesting tool on all levels of the education system (Prokša, 2001).

For the future, similar researches should be held so that to monitor the e-learning concepts of students of other faculties and check whether their approach to e-learning is influenced by their future profession, i.e. first, whether e.g. respondents from teacher training faculties emphasize the pedagogical dimension of e-learning as the Informatics students do with dimensions closely relating to information technology; and second, how the didactic approach is reflected in the e-learning concept (Šimonová, 2013).

Acknowledgements

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